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# CURRENT SUPPORT BRIEF

## SOVIET ASSISTANCE IN DEVELOPMENT OF BRAZILIAN OIL SHALE

OFFICE OF RESEARCH AND REPORTS

CENTRAL INTELLIGENCE AGENCY

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## SOVIET ASSISTANCE IN DEVELOPMENT OF BRAZILIAN OIL SHALE

According to a recent press report from Rio de Janeiro, machinery for use in exploiting Brazilian oil shale deposits will soon arrive in Pindamonhangaba, Sao Paulo, from the Soviet Union under a contract between a private Brazilian company, Companhia Industrial de Rochas Bituminosas (CIRB), and the USSR. CIRB originally contracted for Soviet technicians to make geologic and technical studies to determine the feasibility of commercial development of oil shale deposits in Brazil's Paraiba Valley. On the basis of these studies another contract was signed under which the Soviet Union is to supply equipment and provide technical assistance in the construction of a shale-gas plant.

Because Brazil has inadequate reserves and production of petroleum and coal, and consequently is forced to depend heavily on imported fuels, Brazilians have given increased attention in recent years to the development of deposits of oil shale in the southern part of the country. These deposits are second in size only to those of the US and are estimated to contain 102 billion barrels of shale oil compared to US reserves of 1.1 trillion barrels in Colorado, Wyoming, and Utah. 2/ On the other hand, reserves of crude oil were estimated in 1960 at about 620 millions of barrels. In 1961, production amounted to about 35 million barrels, compared to consumption of around 100 million barrels. 3/ Oil accounted for nearly 17 percent of the total value of Brazil's imports in 1960. 4/ An expansion of Brazil's energy base is necessary for the country's industrial growth and conditions appear favorable for the development of oil shale.

CIRB and one other firm are the only private companies which retain concessionary rights for oil shale exploitation in Brazil. The major part of Brazil's oil shale reserves is in the hands of the national oil monopoly, Petrobras. Both Petrobras and CIRB have been experimenting with oil shale in two small pilot plants in the vicinity of the Tremembé deposits. CIRB has been interested in the construction of a plant at Pindamonhangaba for commercial production of gas and other by-products and has sought technical assistance from the USSR. With the approval of Brazil's National Petroleum Council, a group of Soviet experts spent nearly three months at the site during the early part of 1960. 5/

Although the Soviets reported that a development project was feasible, officials of Petrobras expressed doubt that sufficient consideration was given to various economic aspects of the proposal, particularly the heavy investments required for construction of a large plant and a pipeline to Sao Paulo. 6/ The Petrobras experts also claim that the Tremembé shale is rather low in quality inasmuch as the content of hydrocarbons is only 5 percent and only about 40 percent of the hydrocarbons could be recovered in processing. 7/

Petrobras may be biased in its evaluation of the CIRB properties because of its own interests. It does appear, however, that better prospects for development of oil shale exist at the Iraty deposits, which are Brazil's largest and extend from the State of Sao Paulo into Uruguay. The Iraty shales are superior to the Tremembé shales because they have a higher content of hydrocarbons--7 to 9 percent--and considerably less moisture. 8/ Petrobras has considered the construction of a processing plant at São Mateus do Sul in Parana State, about 300 miles southwest of Sao Paulo. On an experimental scale, the proposed plant would treat 1,000 tons of shale daily from which there could be

extracted about 70 tons of oil, 8 tons of sulfur, and some gas. The cost of the shale oil is expected to be no higher than imported oil.9/ Since the early part of 1958 Petrobras has engaged the firm of Cameron and Jones of Denver, Colorado, as consultants on the project. This firm has had considerable experience with the operation of the oil shale project of the US Bureau of Mines at Rifle, Colorado.10/

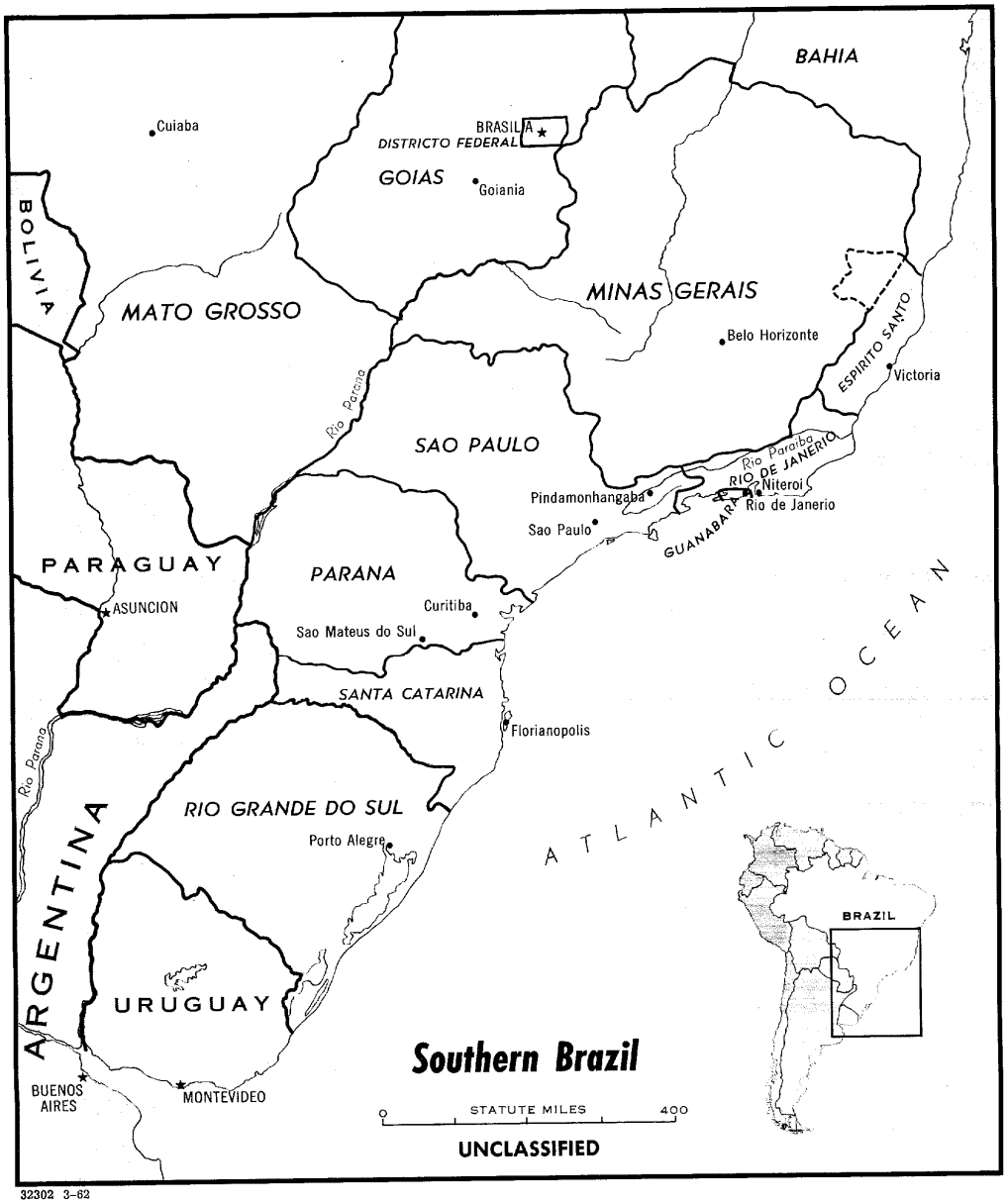
With the resumption of diplomatic relations between Brazil and the USSR last year the climate for Soviet participation in the development of oil shale was greatly improved. The exact status of the proposed CIRB project is unclear, however. The USSR announced in May 1961 that plans had been approved for a plant to be built in Brazil to distill shale in accordance with a contract concluded with CIRB. The plant was being designed by the Leningrad Institute and experiments were being conducted for the purpose of supplying cheap fuel to Sao Paulo, Rio de Janeiro, and adjacent areas.11/ According to Soviet statements, construction of the plant was to have commenced at the end of 1961, but there has been no indication that any work has been undertaken at the plant site. If a recent press report from Rio is correct in stating that the first Soviet equipment for the project is expected to arrive soon, work on the plant presumably will get underway this year.12/

Soviet capabilities for providing technological assistance in the development of an oil shale industry in Brazil are based on more than 40 years of experience in the field, including production of oil, gas, and chemicals from shale and the use of shale as a solid fuel. In 1961, it is estimated that a maximum of about 5 million barrels of shale oil and 900 million cubic meters of shale gas were produced in the USSR. Soviet production of shale oil was considerably greater than the total for the Free World and may have exceeded that of Communist China. Chemicals derived from shale oil are being or will be used in the USSR in the manufacture of roofing paper, tanning agents, impregnating oils, drying oils for paint, detergents, acetone, and also phenol, polyethylene, and polystyrene for plastics.13/ As a solid fuel, oil shale has been used in railroad locomotives and in thermal powerplants.

The USSR probably can provide Brazil with any type of equipment for the oil shale industry found in the Free World, as well as some types that are not utilized outside of the Soviet Union. The USSR is the only country that has developed a shale-gas industry, and has two plants in operation, each with a capacity of more than 400 million cubic meters annually. These plants, at Kokhtla-Yarve and Slantsy, consist of chamber ovens that are heated with gas generated in the conventional type of retorts. This type of plant provides gas with a high heat value (4,000 K cal/cu m).14/

For the production of shale oil the USSR has obtained good results with tunnel ovens, which are installed at the Kokhtla-Yarve and Kiviyli plants. The main advantages of tunnel ovens are: 1) high throughput capacity; 2) high yields of crude oil and of the benzine fraction; 3) low content of impurities in the oil; and 4) low capital costs. These ovens, however, have comparatively low heat efficiency and are down for repairs much of the time. Older ovens could process 250 to 350 tons of shale daily, but the last two ovens built in 1956-57 at Kokhtla-Yarve, each had a throughput capacity of 450 tons daily. Because the Estonian shale is relatively rich in organic matter, the yield of shale oil from these ovens is high, averaging about 20 percent, or one ton of oil from five tons of shale.15/

The USSR also operates a large number of the common type of shaft retorts, although new units are considerably larger than those used in other countries. The new retorts, capable of processing 120 tons of shale daily, are considerably more efficient than the older units that have a capacity of only 35 to 40 tons of shale daily. It is likely that the plant being furnished to Brazil is a small pilot plant of the shaft retort type.



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